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Research area: Product aims

Process measuring and control technology

Key words:

Topography, OBA, NIR, paper structure

TITLE:**Mobile device for the space-resolved optical measurement of paper structures****Background/Problem area**

Paper is nowadays produced on machines with a width of up to 10 m and speeds of up to 2000 m/min. Even though some essential paper characteristics can already be measured online, most of them defy online measurement because of the high speeds. However, there is a demand for analysing the outer and inner structures of paper during production quickly, with little effort and in a space-resolved way because they influence the paper quality and finishing results such as the print quality of graphic papers. Measurement devices fulfilling these demands in their complexity are currently not yet available in the market.

Objectives/Research results

Aim of the research project is to develop a mobile device to optically measure the inner and outer structures of paper and distribution of main components in coated and uncoated papers close to production in a space-resolved and precise way, focusing on the following characteristics:

- Surface structure (smoothness, topography)
- Internal structure (microformation)
- Coat thickness variations (indirect measurement) → Determining the structural distribution of optical brightening agents (OBA) in coated paper as an indicator of coat thickness variations
- Structural distribution of components (e.g. binder) using NIR-technology.

The structures or structural distribution of ingredients (OBA, binder etc.) must be determined on one and the same measuring surface or part of the measuring surface to identify interactions. To fully utilise the advantages of the new measurement device, it is necessary to generate a data base of structural paper characteristics for the device as well as for competitive products within the scope of this research project.

The main requirements to the device were determined jointly with the project partner INNOWEP (requirements specification). Measuring stations were designed and built that are highly flexible in terms of measuring surface and illumination (geometry, UV, IR radiation). Preliminary image acquisition tests were successfully completed at both PTS and the project partner.

The necessary equipment and software concepts were developed.

Various papers (illustration printing and other sheet-fed offset papers, web offset papers) were procured together with the associated print products to test a prototype. Conventional paper tests were performed, and the typographical tests are about to be completed. To be able to compare the evaluation results of the new device with those of commercially available single-parameter devices (measuring just one characteristic), the topography of papers was comprehensively assessed also by optical methods.

Application/Economic benefits

The fast and reproducible identification of important paper characteristics is a key prerequisite for modern quality control and the basis for systematic product and process optimizations leading to significant cost savings for paper producers. In combination with high-precision laboratory systems, the new measurement device will help to significantly improve the assessment of paper structures close to production.

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Remarks

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